

PERITONITIS IN CHILDREN FROM UNKNOWN SITES OF INFECTION.*

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THERE are certain phases of peritoneal inflammation in children which differ enough from those ordinarily found in adults to justify their special consideration. Children are more likely to have rapidly spreading, insidious forms of peritonitis than are adults, since they are less likely to encapsulate the inflammation. They are much less likely to be constipated during its course, and hence have less of that tympanites which is so hard for the patient, but which is a telltale to the doctor. They are much more likely to have associated cerebral symptoms, so that very competent observers are sometimes at a loss to know whether a given case is to be considered as primarily cerebral or abdominal. Again, pulmonary inflammation is often accompanied by localized abdominal pain and rigidity, so that children with beginning pneumonia are believed to have appendicitis. Pneumococcus peritonitis, either isolated or associated with other pneumococcus inflammations, is much more common in children than in adults. General gonococcus peritonitis is occasionally found. Tubercular peritonitis is common, and sometimes presents symptoms which are most difficult to interpret.

The particular form of peritonitis to which this paper refers is usually due to streptococcus infection. It spreads with great virulence through the abdomen; it is not easy of diagnosis, and is not associated with any discoverable site of infection. The following cases illustrate the subject:

CASE I.—A child of seven years, who was one of the Central American Indians sent to this country for education,

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was admitted to St. Mary's Hospital, February 14, 1906. She had been ill for four days in her school with persistent vomiting and prostration, and was sent in with a diagnosis of gastritis or possibly typhoid fever. Her temperature was 102° , pulse 128, respiration 28. Her abdomen was tense, but was not distended. There seemed to be no point of particular tenderness, but the amount of rigidity indicated that there was an abdominal lesion. Rectal examination showed moderate tenderness on both sides, in about equal degree. Her bowels had moved with an enema. She was admitted to the Medical Division and on admission impressed the House Physician, as she had the school physician, as not being critically ill. On the next day, however, when Dr. Swift and I saw her, she seemed ill enough. Temperature 102.6° , pulse 154, respiration 36; 80,000 leucocytes, 94 per cent. polynuclear. Exploratory laparotomy was done without delay and a general peritonitis was found, with an excessive amount of pus and fibrin throughout the peritoneal cavity. The appendix seemed no more inflamed than the rest of the intestine. Streptococci were found in the pus and pure culture. There was no evidence of primary lesion. The patient died twelve hours later.

CASE II.—This case, a resident of a neighboring town, through her illness of a week illustrated a similar condition. She was three years old, was in good health until March 11, when she began to have a little fever. Next morning she vomited and her temperature went to 102° . It quickly reached 104° and stayed at about that point for a week. She vomited little during the week, and cathartics and enemas were necessary but effectual. She had an otitis media and the drum head was incised. On the night of March 17 she began to vomit persistently, and had abdominal distention. On the next morning, which was the time when I first saw her, she was in a most serious condition. She gasped and kept her mouth moving as if swallowing. Her temperature was 105° , pulse 150, respiration about 30. No lesion could be found outside of the abdomen, and even the abdomen, which was examined after a stomach washing, showed no marked rigidity. What rigidity there was, was rather less than that frequently seen with pneumonia, and was not localized, nor could any localized inflammation be made out by bimanual examination. Operation did not seem advisable. Later in the day another consultant was called from the city. He found the child's eyes

crossed, with an irregularity of the pupils, spasm and rolling of the head, and thought meningitis was present. The child, however, died in a few hours, and on autopsy acute general streptococcus peritonitis was found, with much fibrin and pus. There was no evident source of infection.

CASE III.—Another example of a similar condition was given by a girl, ten and a half years old, who came into St. Mary's Hospital after an illness of a week which began with sharp knife-like pain in the region of the umbilicus. This pain soon extended through the whole abdomen, and was accompanied by nausea and vomiting. She is said to have improved under treatment in bed for four or five days, then was seized with a chill and the abdominal pain increased, and within a few hours she was brought to the hospital with symptoms of general peritonitis. Operation was done immediately and a large amount of free whitish pus was found. The intestines were covered with thick layers of fibrin. The inflammation in the region of the appendix and right tube was slightly more marked than that in other parts of the abdomen, and the appendix was removed, but there was no evidence of perforation; it seemed about like the rest of the intestine. Bacteriological examination showed pure cultures of streptococci in chains of medium length.

She died on the following day and the autopsy showed general peritonitis, which involved the lesser as well as the greater peritoneal cavity. There was no evident source of infection.

It may be well here to refer to a case which Holt * has recorded.

A baby of six months was apparently absolutely healthy until twenty-four hours before admission to the hospital. She then showed general irritability, slight fever, four attacks of vomiting, and passed several thin green stools. By evening the mother was so alarmed that she took her to the hospital,—about eleven o'clock. The child looked ill, but was well nourished. Temperature 102°, pulse 120, respiration 30. Abdomen slightly fuller than normal, not distended. No apparent tenderness, no masses present. Rectal examination negative. She died early the next afternoon, having diarrhoea, vomiting and collapse.

Autopsy.—Acute diffuse streptococcus peritonitis. No perforation of stomach or intestine. Appendix normal. No apparent site of infection.

* Archives of Pediatrics, '03, p. 278.

The autopsy was done two hours after death. No lesions of importance were found excepting in the abdomen, and the abdominal viscera themselves were normal, but there was acute diffuse peritonitis of recent origin, with four to six ounces of turbid fluid containing flocculi of fibrin and pus; patches of fibrin on intestine and on liver and spleen. No perforations of stomach or intestines. Appendix normal. Cultures: Peritoneal exudate, liver, spleen and heart's blood gave streptococcus brevis.

NOTE (by Dr. Holt).—"Careful inquiry gave no clue as to origin of infection.

Few conditions are more obscure than acute peritonitis in infancy. Without autopsy in this case the condition could not have been recognized.

Most of the cases which have come under my observation have been of longer duration and have presented more marked tenderness, distention and vomiting. I have, however, records of at least half a dozen examples of acute peritonitis in infants (suppurative) where the origin was as obscure as in this instance.

Appendicitis is of course to be suspected in infants, as in adults, but there is no evidence whatever in this case that the appendix was involved."

MARTIN, of Philadelphia, (ANNALS OF SURGERY, Dec., '06, p. 917) records a similar case, aged 9 years. Generally miserable for two weeks. Pain, vomiting and diarrhoea for twenty-four hours. General abdominal tenderness on admission, with moderate muscular rigidity. Leucocytosis of 60,000. Operation: General streptococcus peritonitis without apparent site of infection. Death in three days.

MONKS (ANNALS OF SURGERY, June, 1908, p. 964) in describing his technic of bowel washing refers to a similar case, a child of eight years with streptococcus peritonitis without assignable cause.

BONNET (*Lyon Medicale*, Nov. 25, 1906) records the case of a child who died of purulent peritonitis, believing that the source of infection was a facial erysipelas which the mother had.

OPPENHEIMER (*Deutsch. Ztschr. Chir.*, '06, v. 83, p. 456) describes streptococcus peritonitis in a child as an accompaniment of a widely spread and most virulent erysipelas.

ROSSI (*Archiv. Ped.*, '04, p. 395) reports one case, and refers to three others, in addition to the seven which Dienlaffoy had already referred to.

I know of other cases, which have occurred in the practice of my friends, which I am not at liberty to quote, and without doubt large numbers can be quoted from literature, but these are enough to call attention to the existence of this peculiar type of peritonitis.

Kerley in his recent book, "Treatment of Diseases of

Children," relates that he has seen four cases within a year, and that medical treatment in his experience was without value, since every case ended fatally. In the majority surgeons were called in consultation, but invariably advised against operation. Never having had a case recover, he states that he is not in a position to advise treatment.

However, there is surely a certain proportion of cases for whom an early operation is helpful. If the infection happens to be a *coli communis* infection instead of a *streptococcus* infection, operation may be very helpful, as is illustrated by the following case:

CASE IV.—T. McE., aged 10, came into St. Mary's Hospital April 9, 1907, having had an attack of pain in the right side of his abdomen about three weeks previously. This subsided so that he was able to go to school, but apparently he had never felt absolutely well. On the day of admission to the hospital the pain had been severe enough to cause him to leave school. He had marked rigidity in the upper right side of the abdomen and severe pain just below the costal border. Palpation of the appendiceal region showed no marked rigidity or tenderness. There was no abdominal distention. There had been no vomiting. His bowels moved with enemas.

An exploration revealed slight diffuse peritonitis. The intestines were everywhere red and congested, and there was a moderate amount of free fluid, slightly turbid, and a slight fibrinous deposit. The omentum was grayish in appearance. There were a few fragile adhesions to the right of the duodenum and about the head of the colon; excepting for these evidences of inflammation, the stomach, duodenum, gall-bladder, appendix and intestines appeared normal. The appendix was removed as the most probable site of infection. A culture from the fluid gave a growth of *coli communis*. The boy's symptoms promptly subsided and he made a good recovery. The appendix was put in alcohol, and when I studied it in detail on the following day I could force a little bubble through its wall near the tip, although there had been no evidence of a perforation there. I took this to indicate that there was a thin place there which probably had furnished the spot of exit of the infection.

In studying these cases we find that they have not presented the elements for an early diagnosis, principally because abdominal rigidity, either localized or general, is the most important symptom in making such a diagnosis in peritonitis, and this symptom has been wanting or only moderate in degree. It may, however, be an aid in similar cases to remember that this type of peritonitis is not very rare, that the symptoms are usually indefinite, that there is usually excessive vomiting, prostration, without tympanites, marked rigidity or constipation, diarrhœa often being present. The three streptococcus cases which are here recorded all had excessive vomiting, profound prostration and diarrhœa. The coli communis case was much less virulent and gave signs of a peritonitis localized in the right hypochondrium, with no particular difficulty in diagnosis.

The type should be especially considered among children's diseases because of the symptoms, which differ materially from those of adults, and because it occurs so much more frequently in children than in adults.

The studies of Oppenheimer (loc. cit.), Noetzel (*Berl. klin. Chir.*, 47, 241), Clairmont and Ranzi (*Archiv f. klin. Chir.*, 68-76), which covers 1149 cases of peritonitis, indicate great rarity of peritonitis without assignable site of infection in adults.

Besides a clinical interest in this type of peritonitis, there is a scholastic interest as to the manner of infection. It is believed that the infection usually takes place by the passage of the germs through the intestinal wall. There is an extensive literature on this subject. I will only refer to three observers.

Bond (*Brit. Med. J.*, '06, ii.) has carefully reviewed the subject and calls attention particularly to the infection which exists in hernial sacs as showing the passage of germs through the intestinal wall. Where there is a combination of distended bowels with retarded blood supply, of fecal culture media in the intestine and of virulent organisms, there is a strong likelihood that peritonitis will result. This condition is more likely

to occur in the appendix than in any other part of the intestine, and the wall of the appendix is less likely to resist the passage of the germs.

Jensen (*Archiv. f. klin. Chirurgie*, 1903, vol. 69, 1134; vol. 70, 91) studied pneumococcus peritonitis, and among other experiments he fed four animals on virulent cultures of pneumococci in capsules. One of the animals died with pneumococcus peritonitis, and at the autopsy he found follicular enteritis with slight necrosis of Peyer's patches, but no ulcer and no perforation. The pneumococci were found in the intestinal canal, the intestinal wall, the blood and the peritoneum.

Flexner (*Johns Hopkins Bulletin*, 1895) found diplococci within the lumen of the intestine, in its wall nearly to the muscularis mucosa, and within the peritoneum, and also in spaces where he believed the lymphatics furnished the avenue of transit into the peritoneal cavity.